IN THE CLAIMS:

Please AMEND the claims in accordance with the following:

1. (Currently Amended) A multi-directional optical branching apparatus, connected to N (N≥3) optical transmission paths each having a pair of optical paths corresponding to an up-link and a down-link which transmit wavelength division multiplexed signal lights in mutually different directions, for demultiplexing a wavelength division multiplexed signal light input from an input side optical path of each of optical transmission paths into N-1 wavelength groups, and then multiplexing each demultiplexed group with optical signals of different wavelength groups from other directions to output the multiplexed signal light to each output side optical path of a predetermined optical transmission path, comprising:

2xN optical multiplexing/demultiplexing devices each including one common port which is connected in one to one with any one of the input side optical paths or the output side optical paths of said N optical transmission paths, and N-1 branch ports, and being capable of demultiplexing a wavelength division multiplexed signal light input to the common port into the respective wavelength groups, to output from the corresponding branch ports, and also multiplexing the optical signals, which belong to the respective wavelength groups, input to the branch ports, to output from the common port; and

a branch port connecting section that connects in one to one between the respective branch ports of said 2xN optical multiplexing/demultiplexing devices, in accordance with previously set connection rules,

wherein

when N ≥ 4, for said optical multiplexing/demultiplexing devices, one common port and N-1 branch ports are formed by cascade connecting a plurality of devices each having one common port and two branch ports, and

when the physical branch ports formed by cascade connecting the optical multiplexing/demultiplexing is M (M> N-1), said branch port connecting section groups two or more branch ports of said M branch ports, and virtually considers these as N-1 branch ports outputting one ~~of~~ even-numbered ~~or~~ and two odd-numbered wavelength groups, and connects between each of the branch ports.

2. (Original) A multi-directional optical branching apparatus according to claim 1,

wherein said branch port connecting section connects in one to one between the respective branch ports of said 2 x N optical multiplexing/demultiplexing devices, to satisfy

simultaneously; a first connection rule in that branch ports of an optical multiplexing/demultiplexing device where a common port thereof is connected with an input side optical path of one optical transmission path among said N optical transmission paths, are connected in one to one with branch ports of an optical multiplexing/demultiplexing device where a common port thereof is connected with an output side optical path of another optical transmission path; a second connection rule in that branch ports corresponding to the same wavelength group are connected with each other; and a third connection rule in that, for all of combinations where any two are selected from among said N optical transmission paths, between respective branch ports are connected so that the up-link path and the down-link path are respectively linked.

3. (Original) A multi-directional optical branching apparatus according to claim 1, wherein said N-1 wavelength groups are set so that the number of wavelengths of the optical signals in the wavelength group allocated to the up-link, and the number of wavelengths of the optical signals in the wavelength group allocated to the down-link, become the same.

4. (Original) A multi-directional optical branching apparatus according to claim 1, wherein said optical multiplexing/demultiplexing devices use WDM couplers which perform multiplexing/demultiplexing of optical signals, with an adjacent plurality of optical signals of wavelengths, contained in each transmission region, of light passing characteristics corresponding to respective branch ports, as a single wavelength group.

5. (Original) A multi-directional optical branching apparatus according to claim 1, wherein said optical multiplexing/demultiplexing devices use optical interleavers each having light passing characteristics which are periodically varied in a comb teeth shape corresponding to the respective branch ports, which alternately multiplex/demultiplex optical signals arranged at equal wavelength intervals.

6. (Cancelled)

7. (Cancelled)

8. (Original) A multi-directional optical branching apparatus according to claim 1, further comprising:

2 X N power adjusting devices provided on the respective optical paths connecting between the respective branch ports of said optical multiplexing/demultiplexing devices, which adjust the power of optical signals being propagated within said optical path;

optical spectrum monitor sections that respectively monitor the optical spectrums of the wavelength division multiplexed signal lights output from common ports of said optical multiplexing/demultiplexing devices to the output side optical paths of said optical transmission paths; and

control sections that respectively control said power adjustment devices in accordance with the monitor result of said optical spectrum monitor sections, so that the average power of the optical signals belonging to said respective wavelength groups are approximately the same.

9. (Original) A multi-directional optical branching apparatus according to claim 8, wherein said power adjusting devices are variable optical attenuators.

10. (Original) A multi-directional optical branching apparatus according to claim 8, wherein said power adjusting devices are optical amplifiers.

11. (Original) A multi-directional optical branching apparatus according to claim 8, wherein said optical amplifiers are provided between the input side optical paths of said optical transmission paths, and the common ports of said optical multiplexing/demultiplexing devices connected with said input side optical paths.

12. (Original) A multi-directional optical branching apparatus according to claim 8, wherein said optical amplifiers are provided between the output side optical paths of said optical transmission paths, and the common ports of said optical multiplexing/demultiplexing devices connected with said output side optical paths.

13. (Original) A multi-directional optical branching apparatus according to claim 1, further comprising:

N optical amplifiers provided between the input side optical paths of said optical transmission paths, and the common ports of said optical multiplexing/demultiplexing devices connected with said input side optical paths;

optical power monitor sections that respectively monitor the total power of the wavelength division multiplexed signal lights output from said optical amplifiers; and

control sections that respectively control driving states of said optical amplifiers so that the total power of the wavelength division multiplexed signal lights monitored by said optical power monitor sections becomes constant at a predetermined level common to respective directions.

14. (Original) A multi-directional optical branching apparatus according to claim 13, wherein optical amplifiers are provided between the output side optical paths of said optical transmission paths, and the common ports of said optical multiplexing/demultiplexing devices connected with said output side optical paths.

15. (Original) A wavelength division multiplexing optical transmission systems, wherein the multi-directional optical branching apparatus in claim 13 is used for an optical branching node.

16. (New) A multi-directional optical branching apparatus connected to optical transmission paths, comprising:

physical branch ports are formed by cascade connecting an optical multiplexing/demultiplexing devices, and the branch ports outputting at least three wavelength groups, and connects between each of the branch ports.